

Amendments to the Claims

1. (Currently amended) A peptide amphiphile composition comprising:

a hydrophobic component having a single alkyl group greater than six carbons in length; and

a hydrophilic component selected from the group consisting of CCCC~~GGG~~SS*DS*D (SEQ ID NO:1), AAAAGGGSS*DS*D (SEQ ID NO:2), SLSLGGGSS*DS*D (SEQ ID NO:3), CCCC~~GGG~~SS*S*DS*D (SEQ ID NO:4)CCCC~~GGG~~SS*S*~~DS~~D*, AAAAGGGSS*S*DS*D (SEQ ID NO:5) AAAAGGGSS*S*~~DS~~D*, SLSLGGGSS*S*DS*D (SEQ ID NO:6) SLSLGGGSS*S*~~DS~~D*, CCCC~~GGG~~GDSS*DS* (SEQ ID NO:7), AAAAGGGGDSS*DS* (SEQ ID NO:8), SLSLGGGDSS*DS* (SEQ ID NO:9), CCCC~~GGG~~DS*S*DS* (SEQ ID NO:10), AAAAGGGDS*S*DS* (SEQ ID NO:11) AAAAGGGSS*S*~~DS~~*, SLSLGGGDS*S*DS* (SEQ ID NO:12), CCCC~~GGG~~SDS*DS* (SEQ ID NO:13), AAAAGGGSDS*DS* (SEQ ID NO:14) AAAAGGGSS*~~DS~~*~~DS~~*, SLSLGGGSDS*DS* (SEQ ID NO:15), CCCC~~GGG~~SS*DS*DS* (SEQ ID NO:16), AAAAGGGSS*DS*DS* (SEQ ID NO:17), SLSLGGGSS*DS*DS* (SEQ ID NO:18), CCCC~~GGG~~DS*DS*D (SEQ ID NO:19), AAAAGGGDS*DS*D (SEQ ID NO:20), and SLSLGGGDS*DS*D (SEQ ID NO:21), wherein S* is phosphorylated serine,

wherein said hydrophilic component is covalently bonded to said hydrophobic component in said peptide amphiphile, said hydrophilic component having a net charge at physiological pH, and wherein said peptide amphiphile self-assembles to form a cylindrical micelle.

2. (Original) The peptide-amphiphile compositions of claim 1, wherein the net charge on the peptide amphiphile is positive.

3. (Original) The peptide-amphiphile compositions of claim 1, wherein the net charge on the peptide amphiphile is negative.

4. (Original) The composition of claim 3, wherein the negative net charge on the peptide amphiphile is from -4 to -7.
5. (Original) The composition of claim 3, wherein the negative net charge on the peptide amphiphile is -7 or more negative.
6. (Canceled)
7. (Original) The composition of claim 1, wherein the peptide component of said peptide-amphiphile includes residue with a functional moiety capable of intermolecular covalent bond formation.
8. (Original) The composition of claim 7, wherein said residue is cysteine.
9. (Currently amended) A peptide-amphiphile compound comprising:
 - an alkyl tail greater than six carbons in length;
 - a structural peptide selected from the group consisting of CCCCCGGG, AAAAGGG, and SL~~SL~~G~~GG~~, covalently bonded to said alkyl tail; and a functional peptide selected from the group consisting of SS*DS*D, S*S*DSD*D, DSS*DS*, DS*S*DS*, SDS*DS*, S*DS*DS*, and DS*DS*D, wherein S* represents phosphorylated serine, covalently bonded to a hydrophilic component selected from the group consisting of CCCCGGGSS*DS*D (SEQ ID NO:1), AAAAGGGSS*DS*D (SEQ ID NO:2), SL~~SL~~G~~GG~~SS*DS*D (SEQ ID NO:3), CCCCCGGGS*S*DS*D (SEQ ID NO:4), AAAAGGGS*S*DS*D (SEQ ID NO:5), SL~~SL~~G~~GG~~GS*S*DS*D (SEQ ID NO:6), CCCCCGGGDSS*DS* (SEQ ID NO:7), AAAAGGGDSS*DS* (SEQ ID NO:8), SL~~SL~~G~~GG~~GDSS*DS* (SEQ ID NO:9), CCCCCGGGDS*S*DS* (SEQ ID NO:10), AAAAGGGDS*S*DS* (SEQ ID NO:11), SL~~SL~~G~~GG~~GDS*S*DS* (SEQ ID NO:12), CCCCCGGGSDS*DS* (SEQ ID NO:13), AAAAGGGSDS*DS* (SEQ ID NO:14), SL~~SL~~G~~GG~~GSDS*DS* (SEQ ID NO:15), CCCCCGGGS*DS*DS* (SEQ ID NO:16), AAAAGGGS*DS*DS* (SEQ ID NO:17), SL~~SL~~G~~GG~~GS*DS*DS* (SEQ ID NO:18),

CCCCGGGDS*DS*D (SEQ ID NO:19), AAAAGGGDS*DS*D (SEQ ID NO:20), and SLSLGGGDS*DS*D (SEQ ID NO:21), wherein S* is phosphorylated serine,

~~said structural peptide opposite said alkyl tail; said functional peptide having a net charge at physiological pH,~~ wherein the peptide-amphiphile compound self-assembles to form a cylindrical micelle.

10. (Previously amended) The peptide-amphiphile compound of claim 9, wherein said peptide amphiphile has a positive net charge.

11. (Previously Amended) The peptide-amphiphile compound of claim 9, wherein said peptide amphiphile has a negative net charge.

12. (Original) The compound of claim 11, wherein the negative net charge on the peptide amphiphile is from -4 to -7.

13. (Original) The compound of claim 11, wherein the negative net charge on the peptide amphiphile is more negative than -7.

14. (Canceled)

15. (Original) The compound of claim 11, wherein the structural peptide includes a residue with a functional moiety capable of intermolecular covalent bond formation.

16. (Canceled)

17. (Currently amended) A composition comprising:

an aqueous solution of at least one charged peptide amphiphile, said charged peptide amphiphile having a hydrophobic segment consisting of having a single alkyl group greater than six carbons in length and a hydrophilic component selected from the group consisting of CCCCGGGSS*DS*D (SEQ ID NO:1), AAAAGGGSS*DS*D (SEQ ID NO:2), SLSLGGGSS*DS*D (SEQ ID NO:3), CCCCCGGGS*S*DS*D (SEQ ID NO:4)

CCCCGGGS*S*DS*D, AAAAGGGS*S*DS*D (SEQ ID NO:5)
AAAAGGGS*S*DS*D, SLSLGGGS*S*DS*D (SEQ ID
NO:6)SLSLGGGS*S*DS*D, CCCC GG DSS*DS* (SEQ ID NO:7),
 AAAAGGGDSS*DS* (SEQ ID NO:8), SLSLGGGDSS*DS* (SEQ ID NO:9),
 CCCC GG GDS*S*DS* (SEQ ID NO:10), AAAAGGGDS*S*DS* (SEQ ID NO:11)
AAAAGGGS*S*DS*, SLSLGGGDS*S*DS* (SEQ ID NO:12), CCCC GG GSDS*DS*
(SEQ ID NO:13), AAAAGGGSDS*DS* (SEQ ID NO:14)AAAAGGGS*DS*DS*,
SLSLGGGSDS*DS* (SEQ ID NO:15), CCCC GG GS*DS*DS* (SEQ ID NO:16),
AAAAGGGS*DS*DS* (SEQ ID NO:17), SLSLGGGS*DS*DS* (SEQ ID NO:18),
CCCC GG GDS*DS*D (SEQ ID NO:19), AAAAGGGDS*DS*D (SEQ ID NO:20), and
SLSLGGGDS*DS*D (SEQ ID NO:21), wherein S* is phosphorylated serine, wherein
 said hydrophilic component is covalently bonded to said hydrophobic component in said
 peptide amphiphile, said peptide amphiphile having a net charge at substantially
 physiological pH; and an agent for inducing said charged peptide amphiphiles to self
 assemble into a cylindrical micelle.

18. (Original) The composition of claim 17, wherein the net charge of said peptide amphiphile is positive.

19. (Original) The composition of claim 17, wherein the net charge of said peptide amphiphile is negative.

20. (Original) The composition of claim 17 wherein the agent includes solvent removal from the peptide amphiphile solution.

21. (Previously amended) The composition of claim 19, wherein the agent inducing self assembly is chosen from the group consisting of oppositely charged peptide amphiphiles, cations, and anions.

22. (Withdrawn) A composition:

one or more nanofibers formed from charged self-assembled peptide amphiphiles, said peptide amphiphiles having a hydrophobic segment covalently bonded to a hydrophilic segment, said peptide amphiphile having a net absolute charge greater than 3 at substantially physiological pH.

23. (Withdrawn) The composition of claim 22 further including a substrate, said nanofibers covering at least a portion of said substrate.

24. (Withdrawn) The composition of claim 22 further including osteoblastic cells on said nanofibers.

25. (Withdrawn) The composition of claim 22 further including a crystalline material having a crystal axis preferentially oriented with respect to the length of said nanofiber.

26. (Withdrawn) The composition of claim 22 further including osteoblastic cells and a mineral on said nanofibers.

27. (Withdrawn) The composition of claim 22 wherein said nanofibers are preferentially oriented on at least a portion of the substrate.

28. (Withdrawn) A method of treating a patient with tissue engineered material comprised of:

administering a peptide amphiphile composition to a site on said patient in need thereof, said peptide amphiphile capable of stimulating mineralization of said site, said peptide amphiphile compositions having a net charge at physiological pH.

29. (Withdrawn) The method of claim 28, wherein said net charge on the peptide amphiphile is positive.

30. (Withdrawn) The method of claim 28, wherein said net charge on the peptide amphiphile is negative.
31. (Withdrawn) The method of claim 30, wherein the negative net charge on the peptide amphiphile is -4 or more negative.
32. (Withdrawn) The method of claim 30, further comprising the step of adding an agent to induce self assembly of said peptide amphiphiles at said site.
33. (Withdrawn) The method of claim 28, wherein peptide-amphiphile includes and amino acid selected from the group consisting of serine, phosphorylated serine, and aspartic acid.
34. (Withdrawn) The method of claim 28, wherein the peptide-amphiphile includes a residue with a functional moiety capable of intermolecular covalent bond formation.
35. (Withdrawn) The method of claim 34, wherein the functional moiety is cysteine.
36. (Withdrawn) A mineralizable bone-defect filler composition comprised of:
a peptide-amphiphile compound which itself includes an alkyl tail covalently bonded to first end of a structural peptide segment, and a functional peptide covalently bonded to a second end of said structural peptide segment; said functional peptide having a negative net charge at physiological pH; and
cation and anion constituents of a biomineral.
37. (Withdrawn) The composition of claim 36, wherein the net charge on the peptide amphiphile is -4 or more negative.
38. (Withdrawn) The composition of claim 36, wherein the cation includes Ca^{+2} .

39. (Withdrawn) The composition of claim 36, wherein the functional peptide includes an amino acid selected from the group consisting of serine, phosphorylated serine, and aspartic acid.

40 (Withdrawn) The composition of claim 36, wherein the peptide amphiphiles are self assembled.